

# The Future of Food Processing

Amalgamated Research Inc.  
Separation Technologies

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Boise, Idaho



Amalgamated Research Inc.( *ARi* )  
Twin Falls, Idaho,



# Separation Technologies

- Separation technologies account for 40-70 % of total capital and operating expenses in industry
- Mature technologies – Distillation, crystallization, evaporation
- Newer methods - Adsorption, ion exchange, chromatography, membranes

*Reference - “Separation Process Technology”  
by J.Humphrey and G.Keller*



# Concerns of Future Food Processing Plants

- Environmental issues – emissions reduction, elimination or decrease of solid and liquid waste
  - Process improvement – better separation technologies
  - Product development – new products - fractionation
  - Diversification – creation of new and added-value products
  - Energy issues – improvement of energy utilization, alternative fuels
  - Safety issues – sometimes also related to new separation methods
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## ARi's Area of Expertise

- Large-scale chromatography
  - Fractal technology
  - Ion exchange and adsorption
  - Membrane filtration
  - New process development
  - Contract R&D
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# ARi Fractal Fluid Distribution Technology

- Many reaction and separation processes are sensitive to fluid distribution
- ARi's Fractals provide nearly ideal distribution
- New generation of compact efficient fractal equipment for reaction and separation technologies
- Examples:

Chromatography, ion exchange, adsorption, distillation , scrubbing, reaction, hybrid processes,etc.





# Scalable Pilot Equipment

Scalability of separation pilot equipment is a key factor for reliable transfer into factory environment



# ARi's pilot Chromatographic System



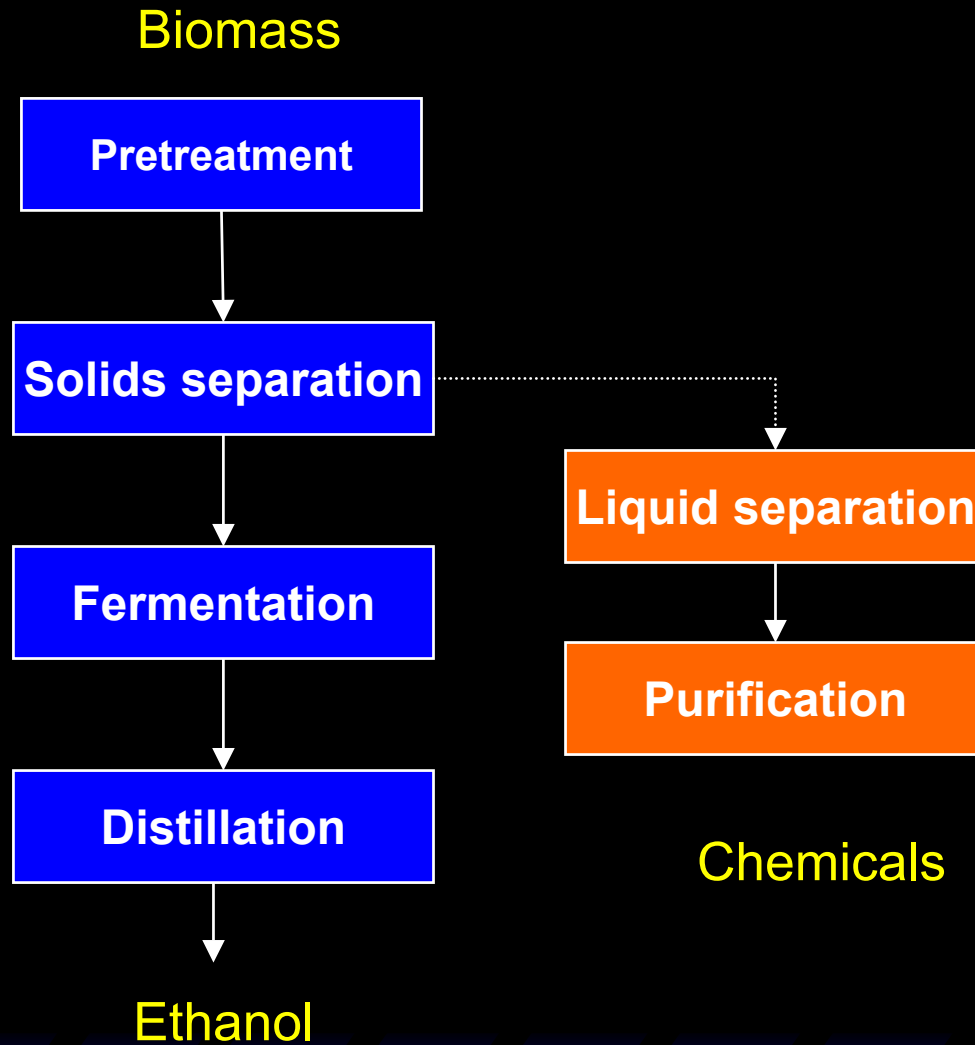
Pilot Softener  
3 inch - diameter  
cells  
with fractal  
distributors



ARi's technologies



# General Biorefinery Concept

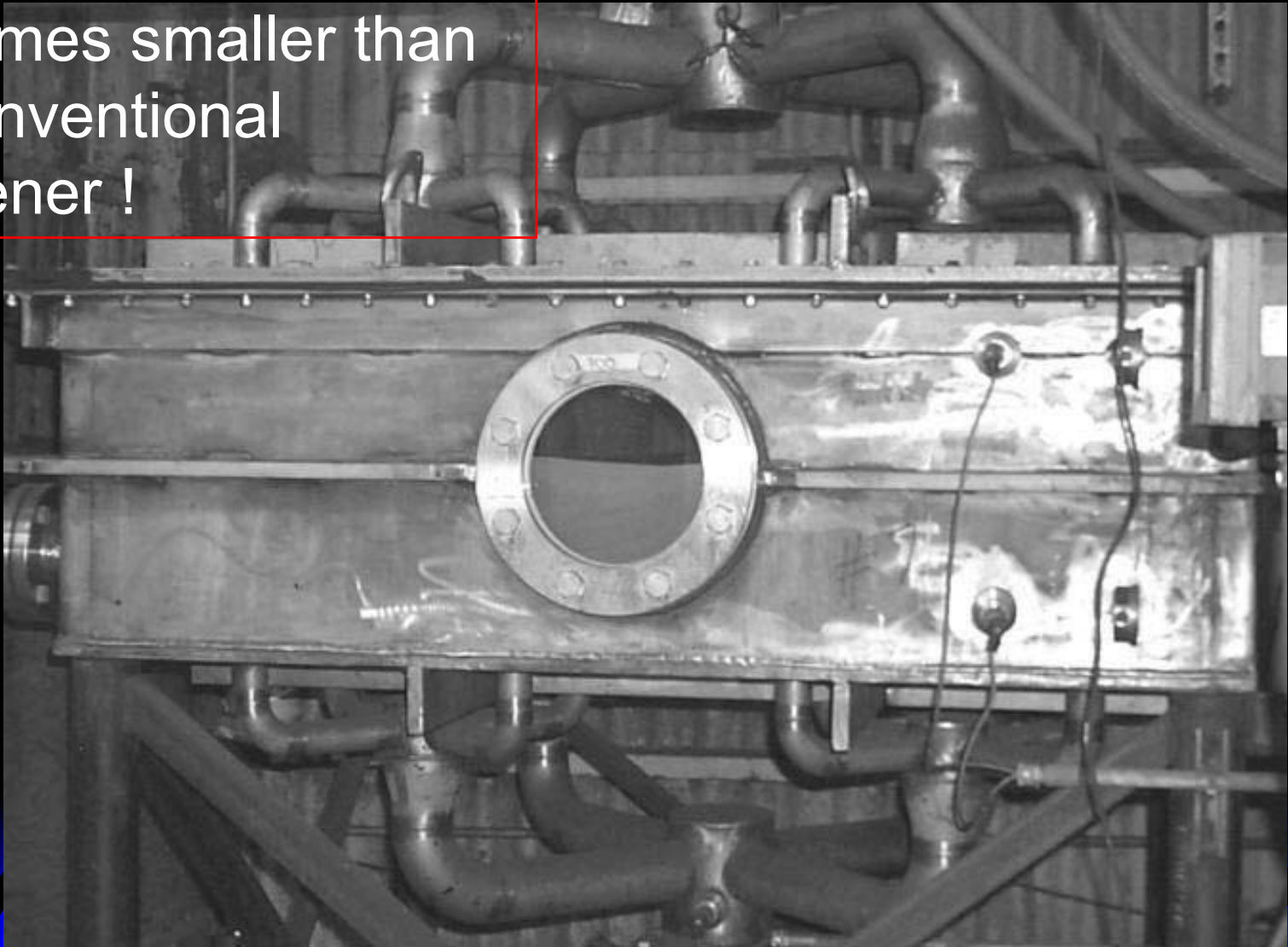


# Elimination of Lime from Sugar Beet Process

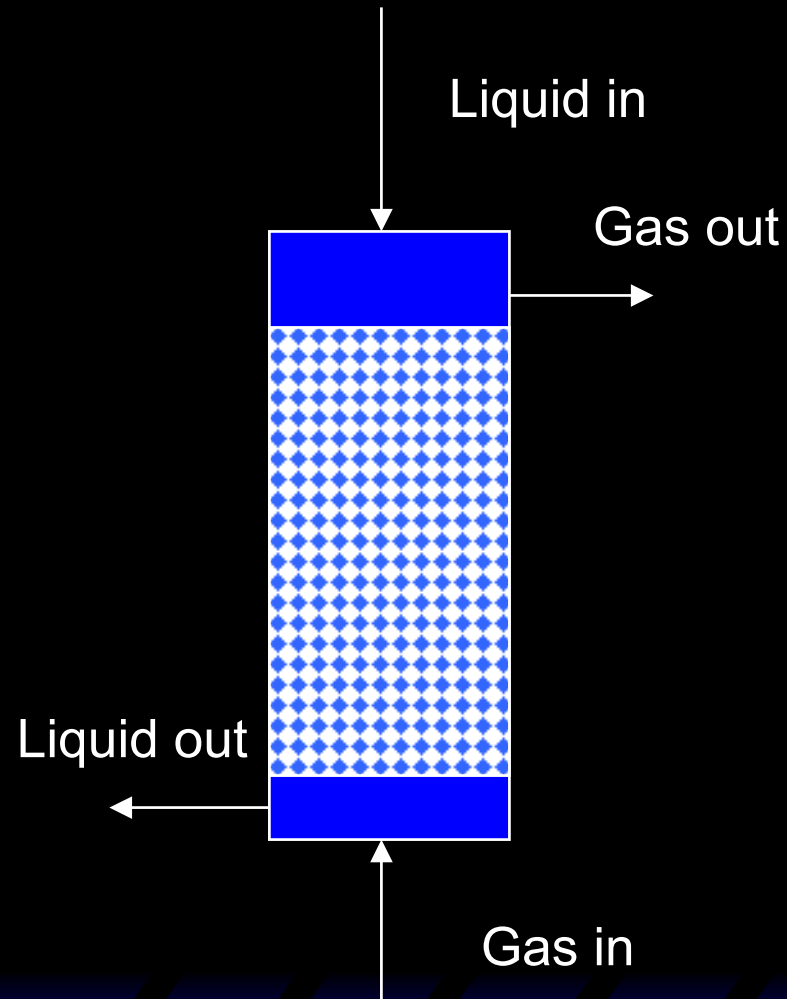


# Fractal Softener ( Amalgamated Sugar Company, Paul, ID )

10 times smaller than  
a conventional  
softener !



# Fractals for Gas-Liquid Systems



## Examples

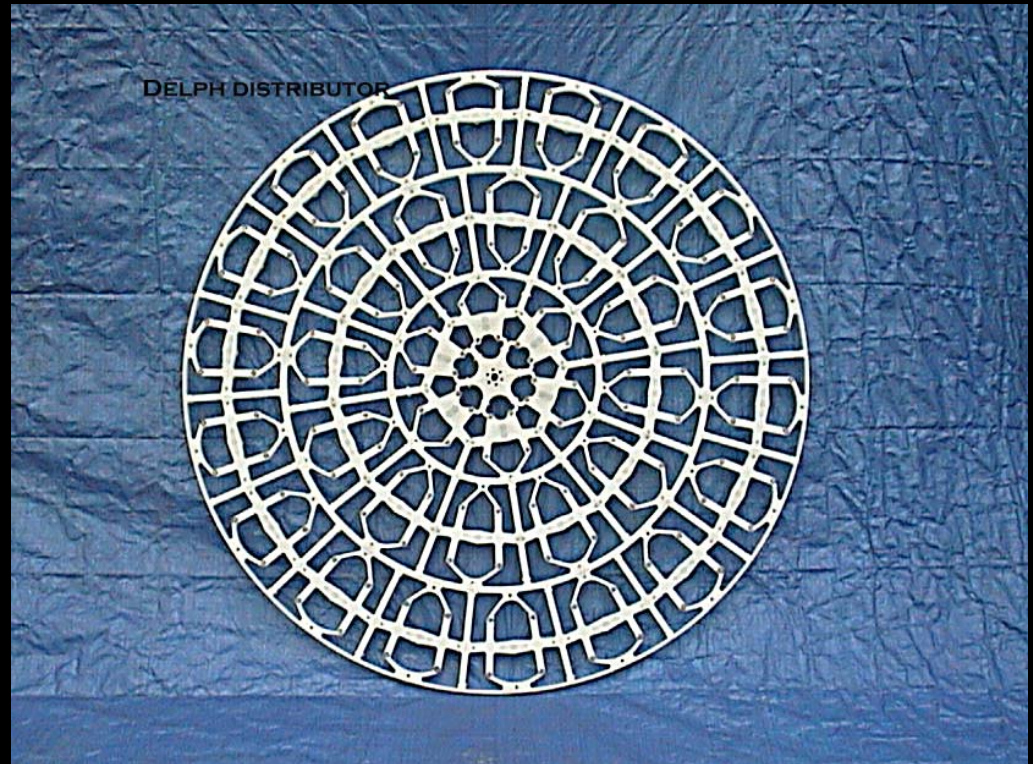
Distillation

Absorption/scrubbing

Extraction

Multi-phase reactors

# Fractal Prototypes for Gas-Liquid Systems



# Existing and Potential Applications

- Sugar and sweeteners- large-scale chromatography
- Biomass – separation and fractionation of monomeric sugars
- Dairy – isolation and fractionation of valuable by-products
- Water treatment – removal of contaminants ( arsenic, nitrates, heavy metals, etc.)
- Mining industry
- Etc...

